

Claims

- [c1] A hydraulic actuator assembly for moving a first object relative to a second object, comprising;
- a first hydraulic actuator having a first cylinder with a first longitudinal axis, and a first piston slidable within the cylinder and attached to a first piston rod for movement along the first longitudinal axis with respect to the cylinder;
- a second hydraulic actuator having a second cylinder with a second longitudinal axis, a second piston slidable in the second cylinder and attached to a second piston rod for movement along the second longitudinal axis with respect to the second cylinder, and a non-rotation mounting between the second piston rod and the second cylinder for non-rotational movement of the second piston rod about the second longitudinal axis; and
- a rigid mounting between the first cylinder and the second cylinder so that the first longitudinal axis is parallel to the second longitudinal axis, and the first piston rod and the second piston rod are movable in opposite directions.
- [c2] The hydraulic actuator assembly according to claim 1

wherein the second piston rod has an axial bore therein.

- [c3] The hydraulic actuator assembly according to claim 2 wherein the non-rotation mounting comprises an anti-rotation rod having a non-circular cross-section and adapted for slidable translation within the axial bore.
- [c4] The hydraulic actuator assembly according to claim 3 wherein at least a portion of the axial bore is adapted with a non-circular cross-section complementary to the cross-section of the anti-rotation rod for slidable non-rotatable receipt of the anti-rotation rod.
- [c5] The hydraulic actuator assembly according to claim 4 wherein the second actuator has an end cap that is non-rotatable about the second longitudinal axis, and the anti-rotation rod is rigidly attached to the end cap for insertion in the axial bore and restrained from rotational movement about the second longitudinal axis.
- [c6] The hydraulic actuator assembly according to claim 3 wherein the non-rotation mounting further comprises a rod insert that is non-rotatably attached to the second piston rod within the second cylinder, the rod insert has a non-circular aperture coaxial with the second longitudinal axis and complementary to the cross-section of the anti-rotation rod, and the anti-rotation rod is slidably

received in the non-circular aperture of the rod insert to prevent rotation of the second piston rod relative to the anti-rotation rod.

- [c7] The hydraulic actuator assembly according to claim 3 wherein the anti-rotation rod has a rectilinear cross-section.
- [c8] The hydraulic actuator assembly according to claim 3 wherein the anti-rotation rod has a hexagonal cross-section.
- [c9] The hydraulic actuator assembly according to claim 3 wherein one of the anti-rotation rod and the axial bore comprises a key and the other of the anti-rotation rod and the axial bore comprises a complementary channel adapted for slidable receipt of the key therein.
- [c10] The hydraulic actuator assembly according to claim 1 and further comprising a non-rotation mounting between the first piston rod and the first cylinder for non-rotational movement of the first piston rod about the first longitudinal axis.
- [c11] The hydraulic actuator assembly according to claim 1 wherein the non-rotation mounting comprises a cylinder end cap non-rotatably attached to the second cylinder and having a non-circular aperture therethrough, and

the second piston rod has a non-circular cross-section complementary to the non-circular aperture and adapted for slidable receipt in the non-circular aperture.

- [c12] A combination of a concrete mixer truck having a concrete delivery chute for delivering concrete from the concrete mixer truck to a preselected location, and a hydraulic actuator assembly attached to the concrete mixer truck for positioning the concrete delivery chute relative to the concrete mixer truck, comprising:
- a first hydraulic actuator having a first cylinder with a first longitudinal axis, and a first piston slidable within the cylinder and attached to a first piston rod for movement along the first longitudinal axis with respect to the cylinder;
- a second hydraulic actuator having a second cylinder with a second longitudinal axis, a second piston slidable in the second cylinder and attached to a second piston rod for movement along the second longitudinal axis with respect to the second cylinder, and a non-rotation mounting between the second piston rod and the second cylinder for non-rotational movement of the second piston rod about the second longitudinal axis; and
- a rigid mounting between the first cylinder and the second cylinder so that the first longitudinal axis is parallel to the second longitudinal axis, and the first piston rod

and the second piston rod are movable in opposite directions.

- [c13] The combination according to claim 12 wherein the second piston rod has an axial bore therein.
- [c14] The combination according to claim 13 wherein the non-rotation mounting comprises an anti-rotation rod having a non-circular cross-section and adapted for slidable translation within the axial bore.
- [c15] The combination according to claim 14 wherein at least a portion of the axial bore is adapted with a non-circular cross-section complementary to the cross-section of the anti-rotation rod for slidable non-rotatable receipt of the anti-rotation rod.
- [c16] The combination according to claim 15 wherein the second actuator has an end cap that is non-rotatable about the second longitudinal axis, and the anti-rotation rod is rigidly attached to the end cap for insertion in the axial bore and restrained from rotational movement about the second longitudinal axis.
- [c17] The combination according to claim 14 wherein the non-rotation mounting further comprises a rod insert that is non-rotatably attached to the second piston rod within the second cylinder, the rod insert has a non-circular

aperture coaxial with the second longitudinal axis and complementary to the cross-section of the anti-rotation rod, and the anti-rotation rod is slidably received in the non-circular aperture of the rod insert to prevent rotation of the second piston rod relative to the anti-rotation rod.

- [c18] The combination according to claim 14 wherein the anti-rotation rod has a rectilinear cross-section.
- [c19] The combination according to claim 14 wherein the anti-rotation rod has a hexagonal cross-section.
- [c20] The combination according to claim 14 wherein one of the anti-rotation rod and the axial bore comprises a key and the other of the anti-rotation rod and the axial bore comprises a channel adapted for slidable receipt of the key therein.
- [c21] The combination according to claim 12 and further comprising a non-rotation mounting between the first piston rod and the first cylinder for non-rotational movement of the first piston rod about the first longitudinal axis.
- [c22] The combination according to claim 12 wherein the non-rotation mounting comprises a cylinder end cap non-rotatably attached to the second cylinder and having a non-circular aperture therethrough, and the second pis-

ton rod has a non-circular cross-section complementary to the non-circular aperture and adapted for slidable receipt in the non-circular aperture.